

Service Manual for Volumetric Infusion Pump

green stream[®]

ARGUS 707

Made in Switzerland

CE 0120



**ARGUS Medical AG, CH-3627 Heimberg / Switzerland
(A member of the CODAN group)**

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1. INTRODUCTION

1.1. General

IMPORTANT!

This service manual is intended for the exclusive use of authorized persons who have been trained by ARGUS Medical AG in the maintenance and repair of the ARGUS 707 infusion pump.

The service manual is meant to be used together with the user manual.

IMPORTANT!

ARGUS Medical AG shall not assume any responsibility for any manipulations which have been carried out on the ARGUS 707 infusion pump by a non-authorized person.

This manual contains the latest data available. It is subject to further modifications in accordance with technical improvements.

2. PUMP CONFIGURATIONS

2.1. General

CAUTION!

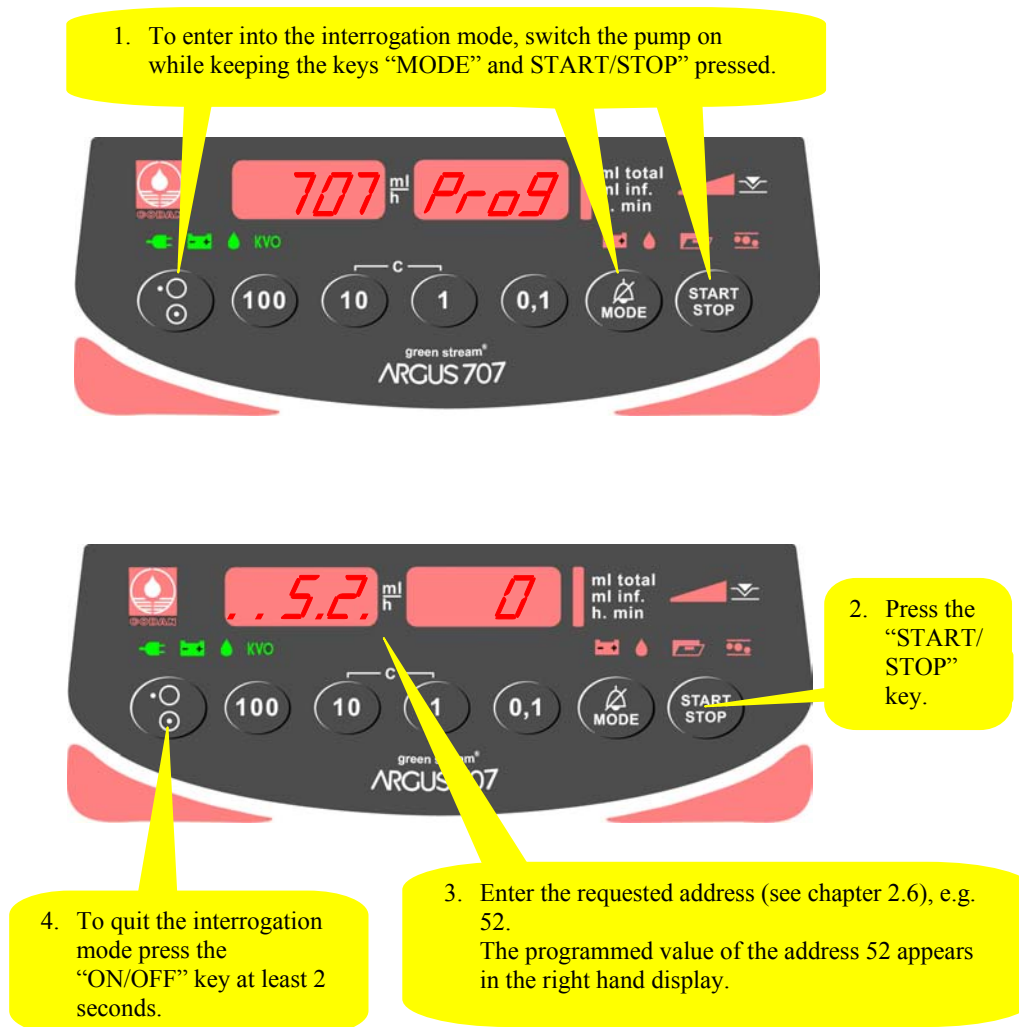
The configuration possibilities constitute a modification of the pump and may only be carried out by authorized persons!

CAUTION!

After changing the configuration a function check and a control measurement has to be performed!

2.2. Interrogation mode

With the interrogation mode you can read the present configuration of the pump without the possibility to modify any configurations.



Flashing decimal points indicate which display is ready to accept an input by the keys 100, 10 & 1.

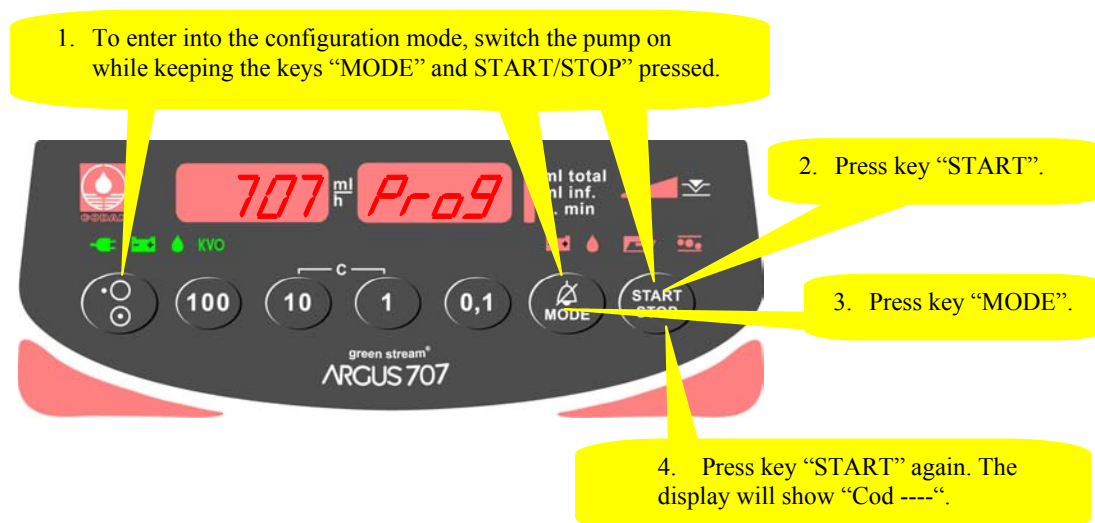
In the interrogation mode the left hand display shows the address and the right hand display shows the according value configured at this address. Please refer to chapter 2.6 where the meanings of the addresses are explained.

To modify any configuration data you have to go into the configuration mode.

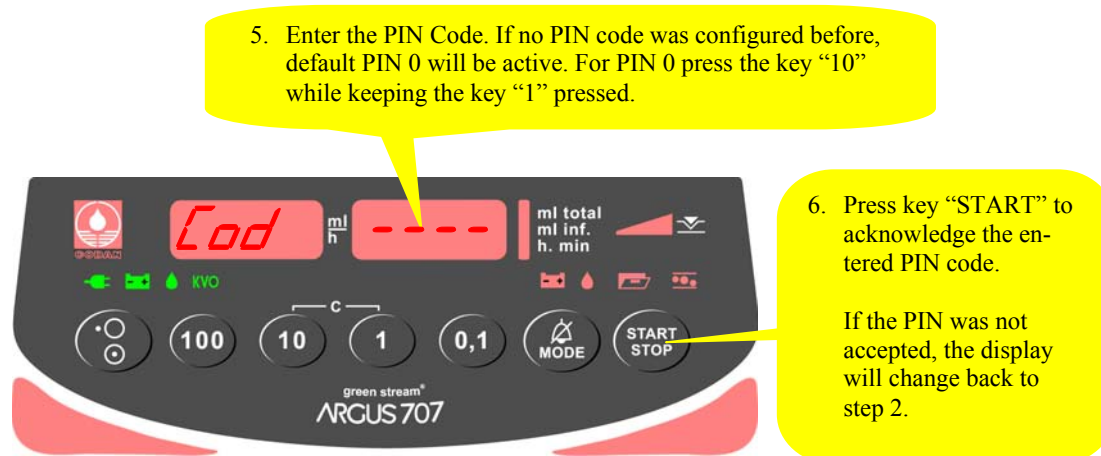
2.3. Configuration mode

The configuration mode allows you to modify the pump configuration manually. Please refer to chapter 2.6 where the meaning of the configuration addresses are explained.

2.3.1. Step 1



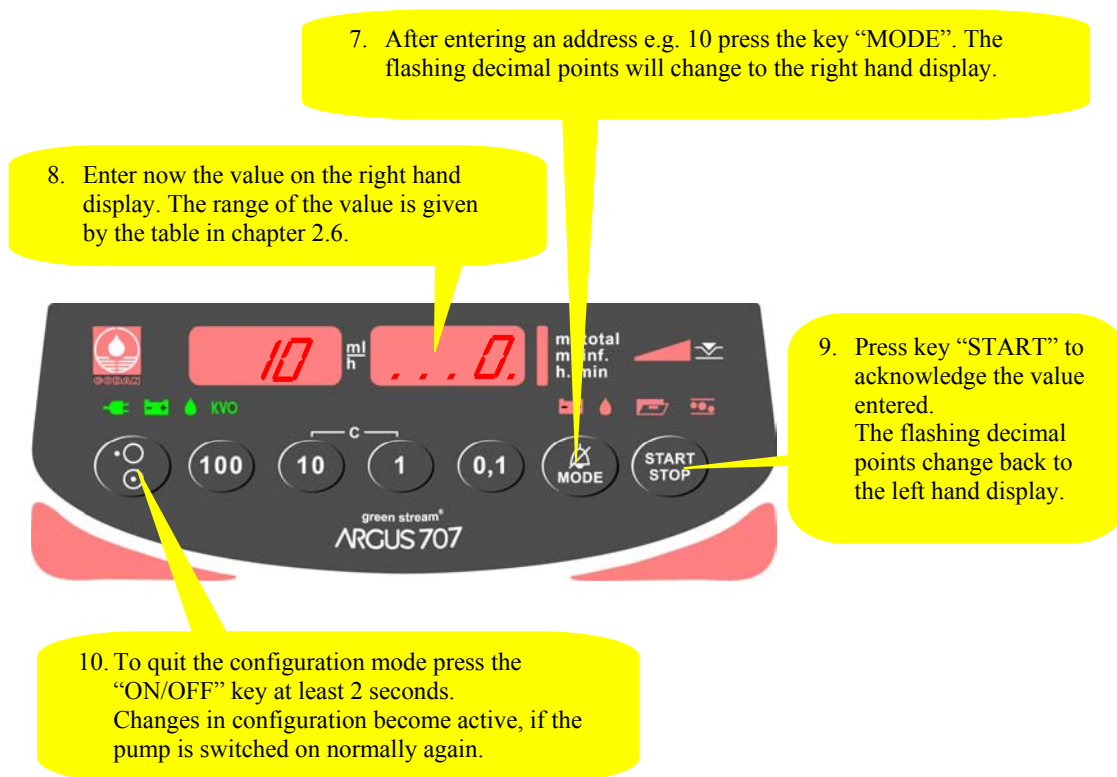
2.3.2. Step 2



If the PIN code was accepted the pump will show the display of chapter 2.3.1 again, but you have now access to all writeable addresses in the list of chapter 2.6.

Select therefore any address in the left display (see next side):

2.3.3. Step 3



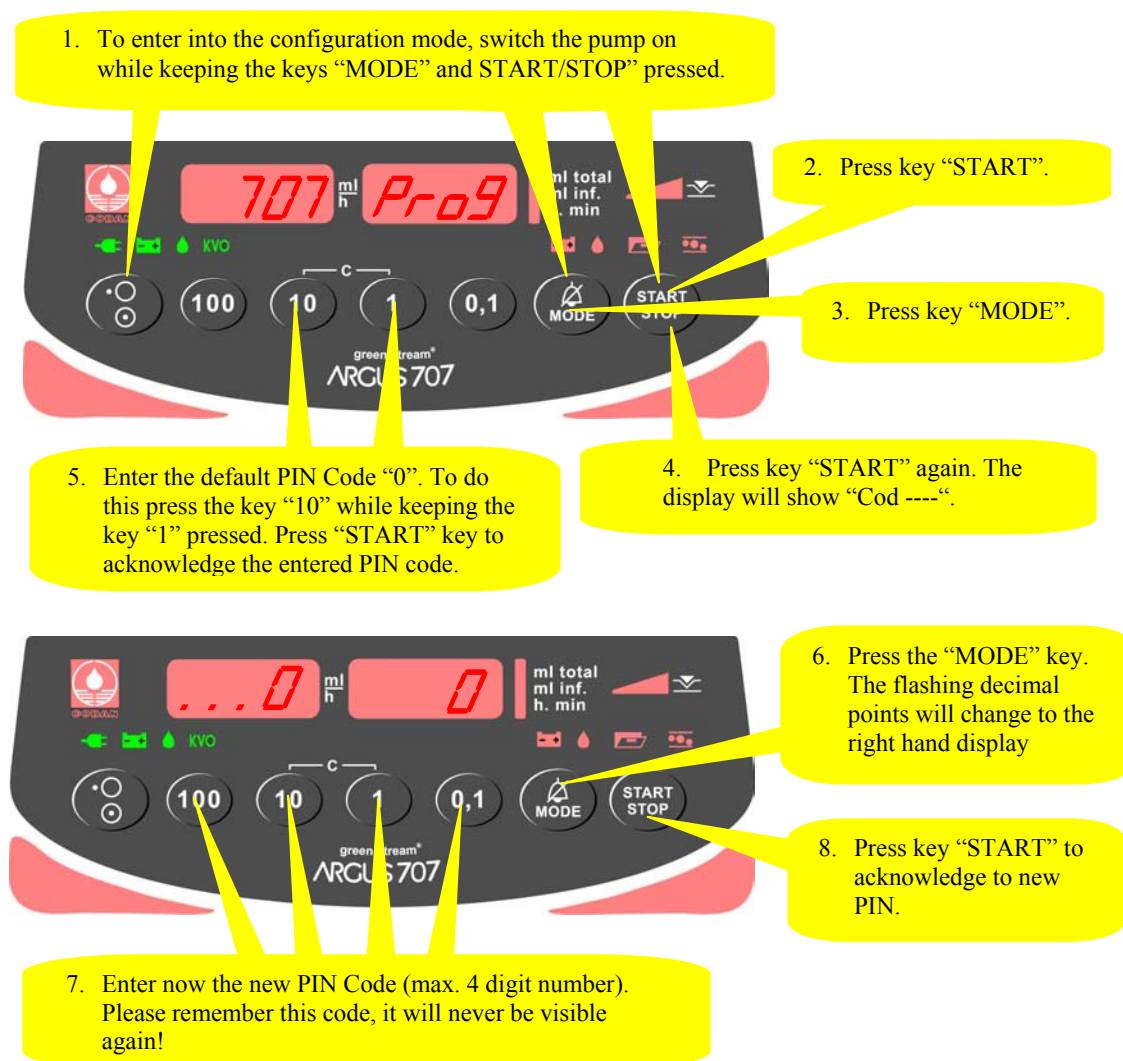
Important remark:

Invalid values entered will be corrected automatically by the pump to the maxima or minima value allowed for the according address!

2.4. First activation of a configuration PIN Code

The activation of a PIN code allows you to protect the configuration from unauthorized persons.

To activate the PIN code, **enter the configuration mode** as described in the previous chapter. For this use the default PIN code “0”:



After you switch the pump OFF and ON again you can enter the configuration mode only, if you enter the correct PIN code in display of chapter 2.3.2.

Please note: The interrogation mode can always be accessed without the PIN.

2.5. Changing an existing pin code

Enter the configuration mode (see chapter 2.3), select address 0 and enter the new pin code.

2.6. Address list of the pump configuration

Add.: Address Def.: Default value of the manufacturer
P: Protection grade (W = Write enabled)

Add.	Def.	P	Function	Range
0	0	W	PIN code active	0=No; 1=Yes
1	1	W	Run indication by running decimal point	0=No; 1=Yes
2	0	W	Key [ON/OFF] only at STOP valid	0=No; 1=Yes
3	0	W	Rate change only at STOP valid	0=No; 1=Yes
4	0	W	Key [STOP] delayed (time at #361)	0=No; 1=Yes
5				
6	0	W	Static alarm (staff alerting system)	0=No; 1=Yes
7	0	W	Display elapsed time in run mode (#8=0)	0=No; 1=Yes
8	0	W	Select remaining time (#7=1)	0=No; 1=Yes
9				
10	0	W	Operation without drop detector	0=No; 1=Yes
11	1	W	Recall "ml/h" (rate) at next power on	0=No; 1=Yes
12	0	W	Recall "ml total" (end volume) at next power on	0=No; 1=Yes
13	0	W	Recall "ml inf." (volume inf.) at next power on	0=No; 1=Yes
14	0	W	SBS Step by step function	0=No; 1=Yes
15	0	W	Display VTBI (Volume To Be Infused)	0=No; 1=Yes
16				
17	1	W	KVO (KOR, mode see (#60)	0=No; 1=Yes
18	0	W	Drop alarm only if bottle empty (#10=0, => 'trA' as default)	0=No; 1=Yes
19	1	W	Buzzer at start	0=No; 1=Yes
20	0	W	Menu 'CLr' (Clear "ml inf.") (#15=0)	0=No; 1=Yes
21				
22	0	W	Menu 'trA' (Transport) (#10=0)	0=No; 1=Yes
23	1	W	Menu 'PrL' (Pressure alarm limit)	0=No; 1=Yes
24	1	W	Menu 'CAP' (Battery Capacity)	0=No; 1=Yes
25	0	W	Menu 'SEt Fill'	0=No; 1=Yes
26				
27	0	W	Menu 'dLo' (Data-lock)	0=No; 1=Yes
28	0	W	Menu 'Stb' (Stand-by)	0=No; 1=Yes
29	0	W	Menu 'MEd' (Medication-no.)	0=No; 1=Yes
30	0	W	Menu 'tM ' (Timer alarm)	0=No; 1=Yes
32	0	W	Menu 'boL ' (Release Bolus)	0=No; 1=Yes
33	0	W	Menu 'boLr' (Bolus rate) (#32=1)	0=No; 1=Yes
34	0	W	Menu 'tot ' (Bolus total) (#32=1)	0=No; 1=Yes
38	0	W	BOLUS application automatic (#32=1, #34=1)	0=No; 1=Yes
40	0	W	Demo mode (menus addr. 20..34 and 7 enabled)	0=No; 1=Yes
41	0	W	Clear "ml/h" after infusion completed	0=No; 1=Yes
42	0	W	Clear "ml total" after inf. completed (#41=1)	0=No; 1=Yes
43	0	W	Air volume accumulated, see #350 and 351	0=No; 1=Yes
44	1	W	Automatic pressure release after occlusion	0=No; 1=Yes
45	1	W	Pressure display (bar graph)	0=No; 1=Yes
46	0	W	Pressure display with indicator (#45=1)	0=No; 1=Yes
47	0	W	Standby- and battery pre alarm low volume	0=No; 1=Yes
48	0	W	Flashing numeric display at alarm	0=No; 1=Yes
49	0	W	Alarm acknowledge only with key [MODE]	0=No; 1=Yes

PUMP CONFIGURATIONS

Add.	Def.	P	Function	Range
50	0	W	Start with >= 1bar downstream pressure allowed	0=No; 1=Yes
55	0	W	Set default serial interface to RJ-45 connector	0=No; 1=Yes
60	0	W	KVO only after infusion completed	0=No; 1=Yes
101	1		Set 1 enabled (always enabled)	0=No; 1=Yes
201	1091	W		
202	1071	W		
203	1061	W		
204	1051	W		
205	1031	W		
206	1023	W		
207	1014	W		
208	1006	W		
209	999	W		
210	988	W		
211	974	W		
212	967	W		
213	947	W		
214	939	W		
215	917	W		
216	900	W		
217	1000	W		
306	0		Infused sum in ml (xxxxyyyy)	[xxxx.... ml]
307	0		Infused sum in ml (xxxxyyyy)	[....yyyy ml]
308	0		Operating time in min (xxxxyyyy)	[xxxx.... min]
309	0		Operating time in min (xxxxyyyy)	[....yyyy min]
310	9999	W	Max. rate in (1/10)ml/h	(1...9999)
311	999	W	Prime rate in ml/h	(1...999)
312	1200	W	Max. bolus rate in ml/h	(1...1200)
313	10	W	Max. bolus total in ml	(1...999)
314	10	W	Upstream occlusion sensitivity (0...60, 60 is highest sensitivity)	(0...60)
316	7	W	Downstream pressure limit "PrL" default value	(1...10)
317	250	W	Air bubble size [microliters]	(50...1000)
318	20	W	Drop-rate window center in [drops/ml]	(10...65)
319	1000	W	Correction factor ((actual/nominal)*1000) refer to chapter 5.5	(850...1150)
350	20	W	Air summation volume, n * 50 [microliters]	(2...40)
351	4	W	Air summation time, n * 8 [min]	(8..64)
361	500	W	Key [ON/OFF] delay (additional key [STOP] if #4=1)	(0...3000)
362	8	W	Display brightness	(2...15)
363	10	W	Buzzer alarm volume	(5...10)
368	300	W	Battery discharge time incl. 15min pre- alarm in [min]	(45...300)
369	5	W	Automatic Menu fall back delay time in [s]	(5...30)

Add.	Def.	P	Function	Range
370	0	W	Clock seconds	(0...59)
371	0	W	Clock minutes	(0...59)
372	0	W	Clock hours	(0...23)
374	0	W	Clock days	(1...31)
375	0	W	Clock months	(1...12)
376	0	W	Clock years	(2000...2099)
380	0		Last failure number (F-XX)	Refer to chapter 5.7
381	0		Last infusion rate at failure	
382	0		.	
383	0		.	
384	0		.	
385	0		.	
386	0		.	
387	0		.	
388	0		Oldest failure number (F-XX)	
389	0		Oldest infusion rate at failure	
390	0	W	Last service date	(yyww, year and week)
391	0		2. last service date	(yyww, year and week)
392	0		3. last service date	(yyww, year and week)
393	0	W	Service interval in months (0 = disabled)	(0...24)
394	0	W	Service interval in hours of operation (0 = disabled)	(0...9999)
395	0	W	Own address for SCI (0 = no address)	(0...127)
396	xxx	W	Serial number of the pump (xxxx yyyy)	[xxxx....]
397	8yyy	W	Serial number of the pump (xxxx yyyy)	[....yyyy]
399	707		Data xxxx -> clears protection key	

2.7. Special configuration options

1. Configuration of a reminder alarm for the safety standard check:

If a safety standard check reminder alarm is configured, the pump will display “Ctrl” after power up when the time has come to perform a standard safety check. To configure a reminder alarm please follow next steps:

First the service interval has to be entered either in months or in hours of operation, or both (address 393, 394).

Next the last service date has to be entered on address 390. Any value higher than 0 entered at the address 393 and/or 394 will release the reminder alarm after the service interval has elapsed (check also the correct settings of the internal clock).

2. PC configuration tool “AConfig”:

With this additional software the pump may be configured from a PC over the serial port. This software may be available from your local distributor or ARGUS Medical AG.

Caution: AConfig may only be used with software versions greater or equal to 1.01.

3. CONFIGURATION AND HISTORY PRINTOUT

3.1. Introduction

CAUTION!

The infusion pump has to be disconnected from the patient before and while the serial interface cable is connected to the pump.

The connection of the ARGUS 707 over the serial interface RS 232 can be done by connecting the interface cable no.10.093 to the serial interface outlet of the serial COM port of a PC.

A data transfer between ARGUS 707 and a PC can be done without any additional software running on the PC.

3.2. Settings of the terminal program

3.2.1. RS232 connection settings of the terminal program



Open the terminal program on the PC, e.g. HyperTerminal, which has been included in every Microsoft® Windows® Operating System.

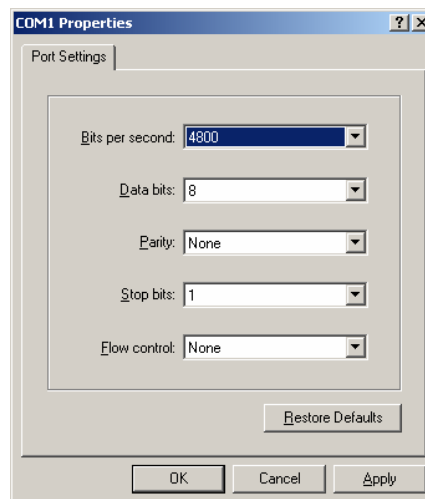
In the “Connection Description” menu, type for e.g. “ARGUS” and click OK.



Please make sure that the correct COM port of the PC has been selected.

Make the appropriate changes on the “COM Properties” menu according to the right hand picture:

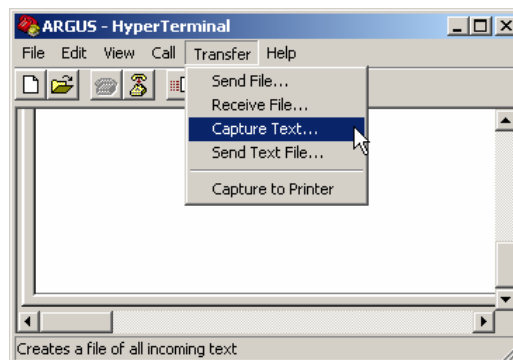
Click OK, then a connection to the pump should now be established.



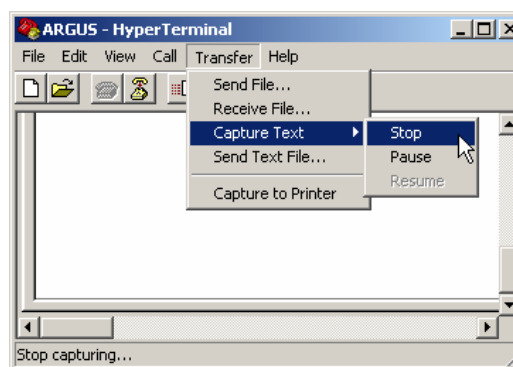
3.2.2. Capturing text from the pump transmitted

If you intent to print out the configuration or the history events transmitted from the pump, you should capture the text transmitted by the pump into a text file. To do this please select “Capture Text” in the hyper terminal’s menu.

A “File box” will open; type a descriptive name for the file, and then click “Start”. The terminal program starts to capture each text received over the serial interface.

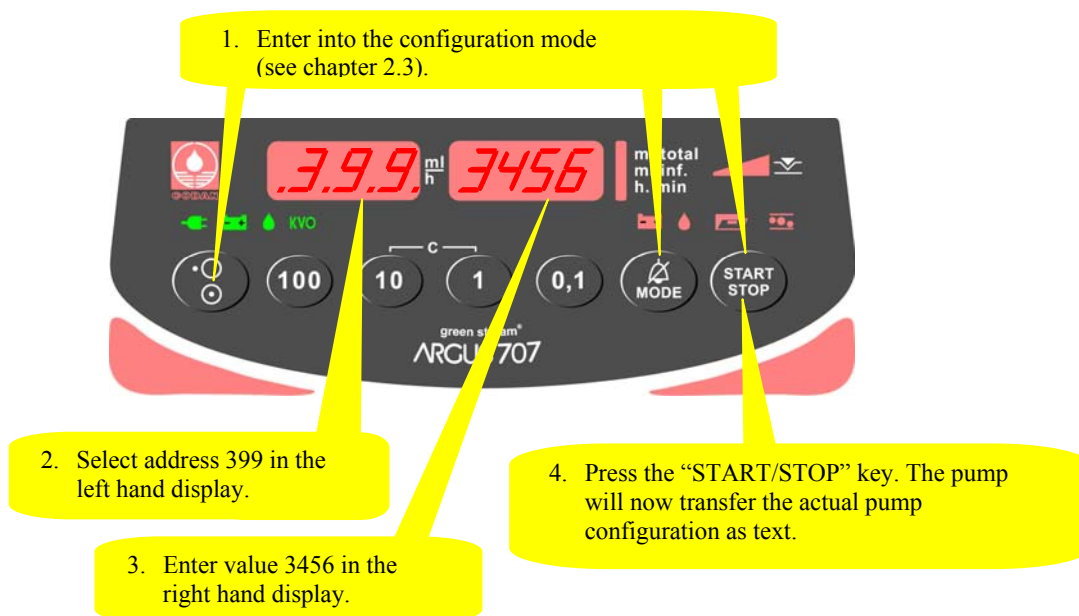


Stop the capturing **after** you did the required pump settings. To do this select “Stop” in the menu “Capture Text” of the terminal program. You will then have a text file including the data transmitted by the pump.



3.3. Configuration printout

Connect the ARGUS 707 to your PC (see chap. 3.1) and setup the terminal program (see chap. 3.2). Start to capture text on the PC side before you switch the pump on.



By saving the transmitted configuration text, you may print it using any text program. See the following example of a configuration printout:

3.3.1. Configuration printout example

/***** Configuration *****/

Sat 17-Jan-2004 19:00:09

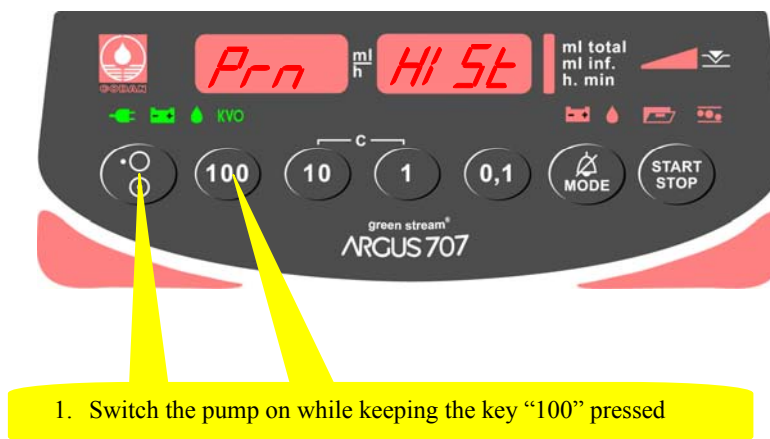
Pump type : ARGUS707
 Inventory number : 005 8 407
 Software release : V1.00 (031218-75C2)
 Infused sum : 861ml
 Operating time : 15h18min
 Last service date :

00=0	50=0	100=0	150=0	200=0000	250=0000	300=0000	350=0020
01=1	51=0	101=1	151=0	201=1091	251=0000	301=0000	351=0004
02=0	52=0	102=0	152=0	202=1071	252=0000	302=0000	352=0000
03=0	53=0	103=0	153=0	203=1061	253=0000	303=0000	353=0000
04=0	54=0	104=0	154=0	204=1051	254=0000	304=0000	354=0000
05=0	55=0	105=0	155=0	205=1031	255=0000	305=0000	355=0000
06=0	56=0	106=0	156=0	206=1023	256=0000	306=0000	356=0000
07=0	57=0	107=0	157=0	207=1014	257=0000	307=8611	357=0000
08=0	58=0	108=0	158=0	208=1006	258=0000	308=0001	358=0000
09=0	59=0	109=0	159=0	209=0999	259=0000	309=2918	359=0000
10=0	60=0	110=0	160=0	210=0988	260=0000	310=9999	360=0000
11=1	61=0	111=0	161=0	211=0974	261=0000	311=0999	361=0500
12=0	62=0	112=0	162=0	212=0967	262=0000	312=1200	362=0008
13=0	63=0	113=0	163=0	213=0947	263=0000	313=0010	363=0010
14=0	64=0	114=0	164=0	214=0939	264=0000	314=0010	364=0000
15=0	65=0	115=0	165=0	215=0917	265=0000	315=0000	365=0000
16=0	66=0	116=0	166=0	216=0900	266=0000	316=0007	366=0000
17=1	67=0	117=0	167=0	217=1000	267=0000	317=0250	367=0000
18=0	68=0	118=0	168=0	218=0000	268=0000	318=0020	368=0300
19=1	69=0	119=0	169=0	219=0000	269=0000	319=1000	369=0005
20=0	70=0	120=0	170=0	220=0000	270=0000	320=0000	370=0012
21=0	71=0	121=0	171=0	221=0000	271=0000	321=0000	371=0000
22=0	72=0	122=0	172=0	222=0000	272=0000	322=0000	372=0019
23=1	73=0	123=0	173=0	223=0000	273=0000	323=0000	373=0000
24=1	74=0	124=0	174=0	224=0000	274=0000	324=0000	374=0026
25=0	75=0	125=0	175=0	225=0000	275=0000	325=0000	375=0007
26=0	76=0	126=0	176=0	226=0000	276=0000	326=0000	376=2003
27=0	77=0	127=0	177=0	227=0000	277=0000	327=0000	377=0000
28=0	78=0	128=0	178=0	228=0000	278=0000	328=0000	378=0000
29=0	79=0	129=0	179=0	229=0000	279=0000	329=0000	379=0000
30=0	80=0	130=0	180=0	230=0000	280=0000	330=0000	380=0000
31=0	81=0	131=0	181=0	231=0000	281=0000	331=0000	381=0000
32=0	82=0	132=0	182=0	232=0000	282=0000	332=0000	382=0000
33=0	83=0	133=0	183=0	233=0000	283=0000	333=0000	383=0000
34=0	84=0	134=0	184=0	234=0000	284=0000	334=0000	384=0000
35=0	85=0	135=0	185=0	235=0000	285=0000	335=0000	385=0000
36=0	86=0	136=0	186=0	236=0000	286=0000	336=0000	386=0000
37=0	87=0	137=0	187=0	237=0000	287=0000	337=0000	387=0000
38=0	88=0	138=0	188=0	238=0000	288=0000	338=0000	388=0000
39=0	89=0	139=0	189=0	239=0000	289=0000	339=0000	389=0000
40=0	90=0	140=0	190=0	240=0000	290=0000	340=0000	390=0000
41=0	91=0	141=0	191=0	241=0000	291=0000	341=0000	391=0000
42=0	92=0	142=0	192=0	242=0000	292=0000	342=0000	392=0000
43=0	93=0	143=0	193=0	243=0000	293=0000	343=0000	393=0000
44=1	94=0	144=0	194=0	244=0000	294=0000	344=0000	394=0000
45=1	95=0	145=0	195=0	245=0000	295=0000	345=0000	395=0000
46=0	96=0	146=0	196=0	246=0000	296=0000	346=0000	396=0000
47=0	97=0	147=0	197=0	247=0000	297=0000	347=0000	397=0000
48=0	98=0	148=0	198=0	248=0000	298=0000	348=0000	398=0000
49=0	99=0	149=0	199=0	249=0000	299=0000	349=0000	399=0707

3.4. History printout

3.4.1. General

Connect the ARGUS 707 to your PC (see chap. 3.1) and setup the terminal program (see chap. 3.2). Start to capture text on the PC side before you switch the pump on.



3.4.2. History header

At the top of the history, a header will appear showing the device type, the software release and if configured, the inventory number and the last service date. It shows also the pump internal real time at the moment of the printout.

Please note that there may be one hour summer or winter time deviation!

3.4.3. History events

Each registered event starts with a message line. Please refer to the complete list mentioned in chapter 3.4.5 which shows the possible messages generated by the user's handling on the pump or by the pump itself.

Each event has a time stamp on the right side of the second line.

3.4.4. History printout example

```

/***** History *****/
Tue 20-Jan-2004 19:40:30

Pump type      : ARGUS707
Inventory number : 005 8 407
Software release : V1.00 (031218-75C2)
Infused sum     : 388ml
Operating time  : 24h44min
Last service date :

Pump off
Rate  = 0040.0ml/h      Inf-Set = 1          Tue 20-Jan-2004 18:29:22
Total = 0000.0ml      PrLimit = 0700mbar
Infsum = 0000.0ml      Status  = 0x0000

Pump on
Rate  = 0040.0ml/h      Inf-Set = 1          Tue 20-Jan-2003 18:27:18
Total = 0000.0ml      PrLimit = 0700mbar
Infsum = 0000.0ml      Status  = 0x0000

```

3.4.5. History messages

Possible messages appearing in the first line of each history event:

No information available	Not enough drops, pump stop
Battery defective	Too many drops, pump stop
Battery low pre alarm	Door open, pump stop
Battery low, pump stop	Inf-Set change
Bolus start	Timer alarm, pump stop (KVO)
Bolus stop	Total volume reached, pump stop (KVO)
External power off	Data lock off
External power on	Data lock on
Downstream occlusion, pump stop	Infsum cleared
PrLimit change	Transport off
Pump has detected failure	Transport on
Pump off	Air bubble, pump stop
Pump on	Bolus total reached
Pump start	Exit setup mode
Pump stop (KVO)	PC configuration done
Rate change	PC configuration failure
Enter setup mode	Pump start, ext. changed parameters
No drops, pump stop	Upstream occlusion, pump stop

4. SOFTWARE UPDATES

4.1. General

This chapter describes the procedure to perform a software update on the ARGUS 707 infusion pump. To check the installed software release in your ARGUS 707 press the "MODE" key while switching on the pump.

Please refer to your local distributor or ARGUS Medical AG to determine the latest software release able to run on your device hardware.

4.2. Requirements for a software update

To update an ARGUS Medical device, the following items are needed:

- A PC with Microsoft® Windows™.
- RS 232 serial interface cable (part no. 10.093), connected to the PC.
- Software file "AMFlasher" and corresponding user instruction (pdf-file) on your PC.
- Data file "A707_xxx.txt" including the pump software which can be downloaded with the "AMFlasher" software.

The file name "A707_xxx.txt" contains the software release (xxx) version of the pump software release.

Those items are available from your local distributor or from ARGUS Medical.

4.3. Safety aspects

Be aware of the following points:

- **For medical device traceability your local distributor or ARGUS Medical AG needs to be informed about every device updates (serial number) you performed!**
- **Do not make any software updates when the device is used and/or connected to a patient!**

CAUTION!

A standard safety check (see appendix) has to be performed after every software update!

5. MAINTENANCE

5.1. General

CAUTION!

Only authorized persons who have been trained by ARGUS Medical AG or by the local distributor are allowed to service the ARGUS 707 infusion pump. In case of repair request, send the unit to the local distributor with a report outlining the exact nature of the failure. More information is available from:

ARGUS Medical AG
CH-3627 Heimberg / Switzerland
E-mail: info@argusmedical.com

CAUTION!

The safety standard check has to be performed at least every 24 month or after 10'000 hours of operation. The check has to be done in accordance to the chapter 7. No special maintenance of the ARGUS 707 infusion pump is necessary. There are no wear and tear parts.

5.2. Recalibration

5.2.1. General

Unless otherwise specified by the customer, the ARGUS 707 has been calibrated by the manufacturer with the CODAN L86 infusion set. If a different infusion set is used (see recommended list in the appendix of the user manual), a recalibration is required.

CAUTION!

A recalibration with a different IV-set always requires a recalibration of both pressure sensors and a volumetric calibration!

CAUTION!

It is mandatory to execute first the calibration procedure of the pressure sensors and afterwards the volume calibration.

5.3. Pressure calibration

5.3.1. General

The volumetric infusion pump ARGUS 707 contains two pressure sensors:

- One upstream sensor, bottle side (left input)
- One downstream sensor, patient side (right output).

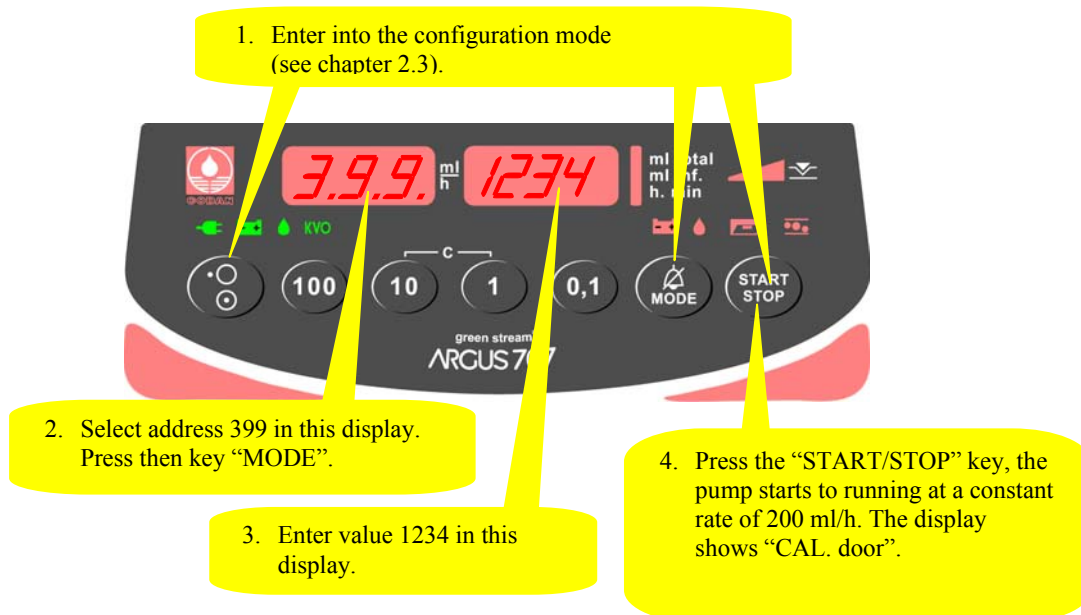
CAUTION!

A pressure calibration becomes necessary if the pressure control measurement was not accurate enough, a new IV-set configured or a pressure sensor replaced or the main board is replaced.

Needed equipment:

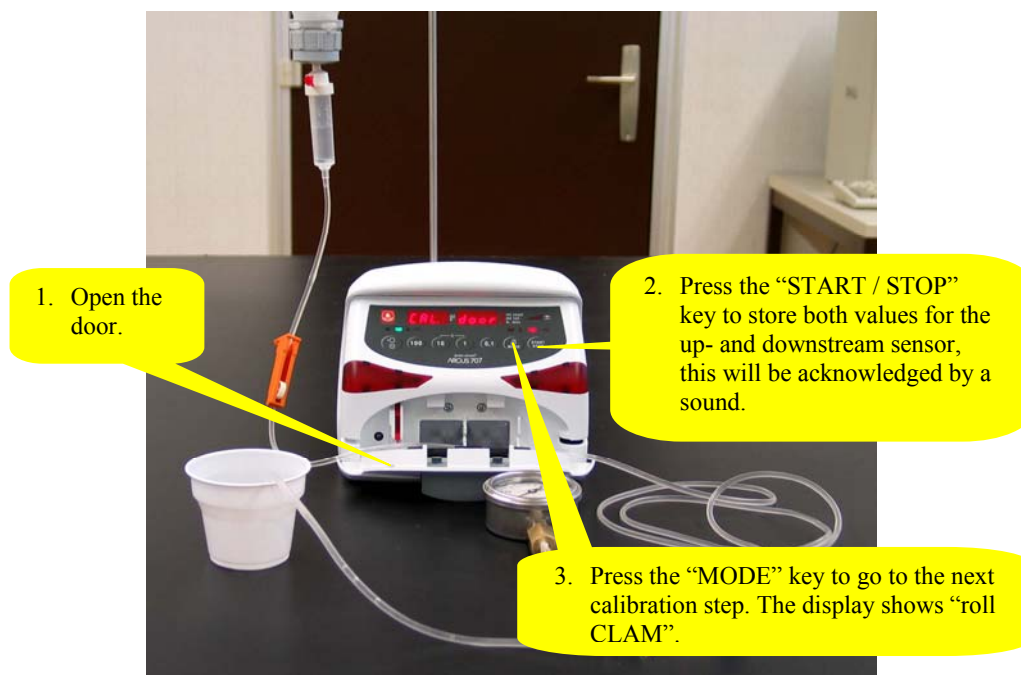
- a manometer with a resolution of 0,05 bar.
- a 3-way stop cock
- the chosen IV-set (refer to the list including the recommended IV-set in the user manual)

5.3.2. Enter the pressure calibration mode



5.3.3. Calibrating the offset of both sensors

Remove any IV-set inserted in the pump!



Remark:

By pressing the key "1" the actual value of the offset voltage in mV is displayed, for the upstream sensor in the left hand display, for the downstream sensor in the right hand display. Return to the original state by pressing the key "1" again.

5.3.4. Calibrating the upstream sensor part 1 (left side)

1. Insert a new IV-set filled with water, place the roller clamp on the upstream side near the pump and close the door. Open the roller clamp and let the pump running for 5 seconds at least.

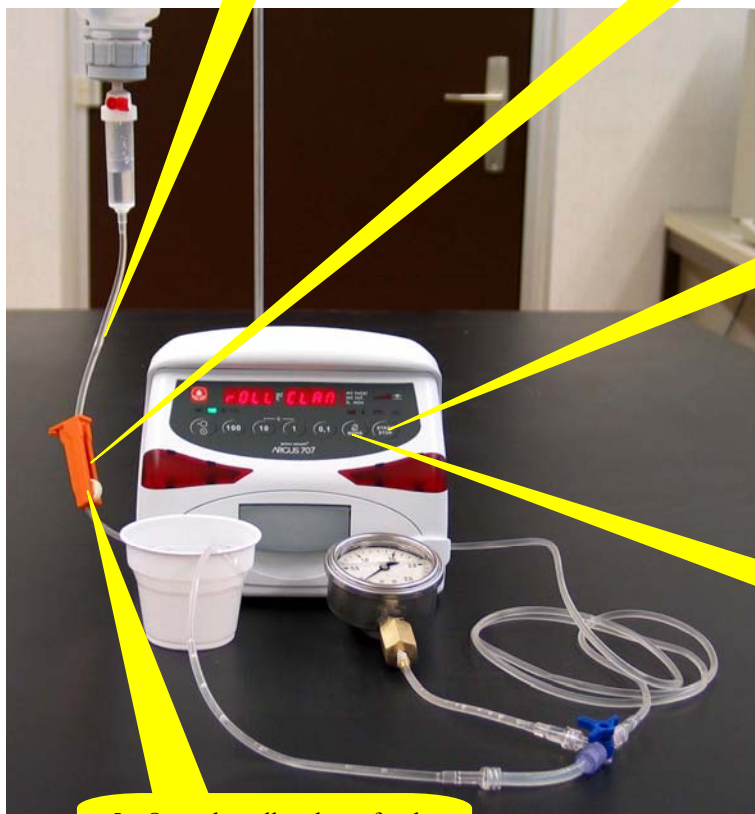
2. Close the roller clamp and wait 10 seconds.

3. Press the "START / STOP" key to store the value for an upstream occlusion. This will be acknowledged by a sound.

4. Press key "MODE" to enter the next calibration procedure.

The display shows "CAL. 0.4b".

5. Open the roller clamp for the next step!

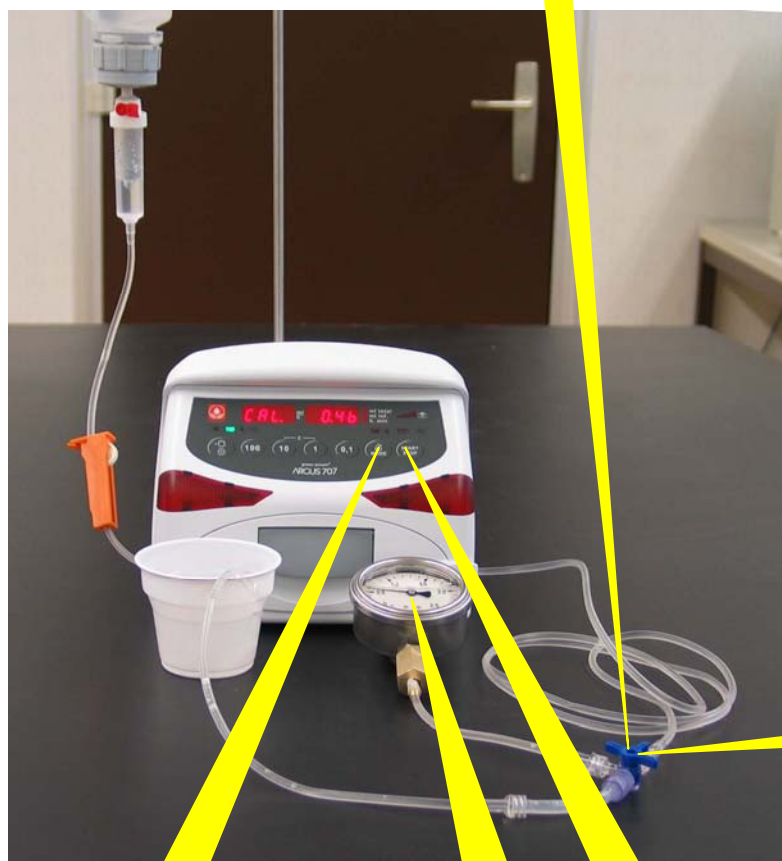


Remark:

By pressing the key "1" the pump display changes to "xxxx Pr S" where the left display shows the actual upstream pressure sensor signal in mV.
Return to the original state by pressing the key "1" again.

5.3.5. Calibrating the downstream sensor (right side).

1. Simulate a downstream occlusion by the 3-way stop cock.
The pump must generate a pressure of at least 1.4 bar. Otherwise there might be a mechanical problem (pressure plate, door hinge, peristaltic, etc.). Release the pressure again.



2. Restart a pressure build-up.

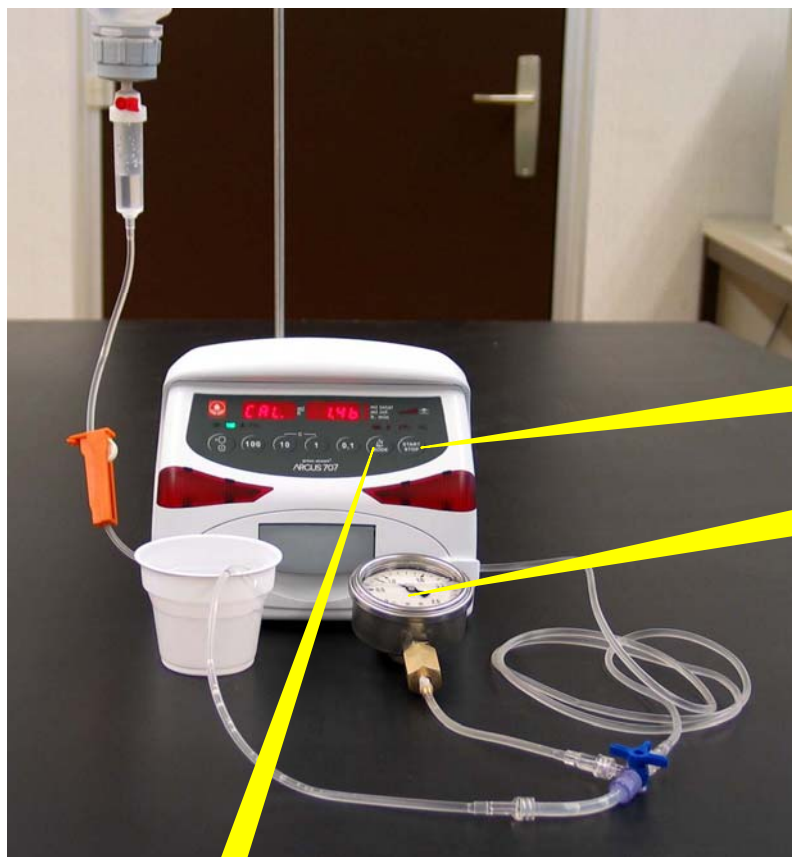
Check for the pressure gauge display which must increase.

4. Press the "MODE" key.
The display shows "CAL. 1.4b". Follow the instructions on the next side.

3. Press the "START / STOP" key when a pressure of 0.4 bar has been reached. The stored value will be acknowledged by a sound.

Remark:

By pressing the key "1" the pump display changes to "Pr S xxxx" where the right display shows the actual downstream pressure sensor signal in mV.
Return to the original state by pressing the key "1" again.



4. Press the "MODE" key. The display shows "CAL. -0.4b". The pump starts to deliver backwards and the pressure in the system decreases.

5. When the occlusion pressure reaches 1.4 bar press the "START / STOP" key. The stored value will be acknowledged by a sound.

Remark:

By pressing the key "1" the pump display changes to "Pr S xxxx" where the right display shows the actual downstream pressure sensor signal in mV.

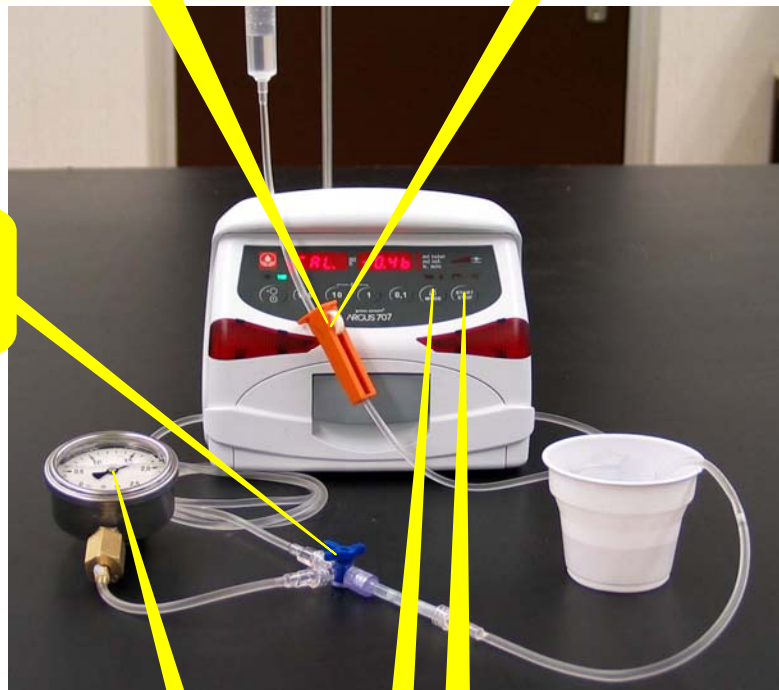
Return to the original state by pressing the key "1" again.

5.3.6. Calibrating the upstream sensor part 2 (left side)

1. Close the roller clamp and install the tube in the **reverse** direction. Close the door.

2. Open the roller clamp.

3. Restart a pressure build-up.



4. Check for the pressure gauge display which must increase. Press the "START / STOP" key when a pressure of 0.4 bar has been reached. Press key "MODE", the display shows "CAL. -1.4b".

Repeat this point at a pressure of 1.4 bar.

5. Switch the pump off and insert the IV-set in the normal direction! Now, perform a pressure control measurement according to chapter "Pressure control measurement".

Remark(s):

- By pressing the key "1" the pump display changes to "xxxx Pr S" where the left display shows the actual downstream pressure sensor signal in mV. Return to the original state by pressing the key "1" again.
- The procedure for the upstream sensor calibration part 2 is equal to the procedure for the downstream sensor, but with inverse delivery direction.

5.4. Pressure control measurement

5.4.1. Downstream control measurement

Start an infusion at an infusion rate of 250 ml/h according to the user manual. Insert a pressure gauge on the downstream (patient) side which monitors the pressure in the tube.

Simulate an downstream occlusion.

The pump must stop and the alarm must be activated at the default pressure limit of 700 mbar \pm 100 mbar, except a different default pressure limit has been configured.

If the result of this control measurement does not fulfil the stated requirement, a pressure calibration according to chapter "Pressure calibration" has to be done.

5.4.2. Upstream control measurement

Start an infusion at an infusion rate of 250 ml/h with the roller clamp on the upstream side near to the pump.

Simulate an upstream occlusion by closing the roller clamp. To avoid the drop alarm release, simulate falling drops on the drop detector.

The pump must stop after several seconds and an upstream alarm (right hand LED in the pressure bar graph) must be activated.

If the result of this control measurement does not fulfil the stated requirement, a pressure calibration according to chapter "Pressure calibration" has to be done.

5.5. Volume calibration

5.5.1. General

There are two ways to calibrate the volume delivered by the ARGUS707 volumetric pump, select one:

- By entering the correction factor
- With the internal calibration program of the pump

Needed equipment: - balance with a resolution of 0,1g at least

5.5.2. Volume calibration by entering the correction factor

1. Insert a new IV-set (only recommended IV-sets may be used, see appendix in the user manual) in the pump and perform a “warm up” infusion of 10 ml at an infusion rate of 999.9 ml/h!
2. Infuse now a volume of 15 ml of water in a measuring cup on a zeroed balance at an infusion rate of 250 ml/h.
3. Determine the weight of the delivered water.
4. Enter the configuration mode as described in chapter 2.3.
5. Go to address #319 and read the present correction factor.
6. Calculate the new correction factor as follows:

$$\text{New correction factor} = \frac{(\text{Present factor}) \cdot (\text{weight of delivered water})}{15^*}$$

e.g.:

Present correction factor: 1020
Weight of delivered water [g]: 14.9
New correction factor: 1013

* Pre-set volume of point 2.)

7. Enter the new correction factor at address #319 (e.g. 1013) in the right hand display and save it by pressing key “START”; then switch the pump off.
8. Perform a control measurement according to the steps 2 & 3 above. Repeat the calibration procedure if necessary.

5.5.3. Volume calibration with the pump integrated calibration program

Needed equipment: - balance with a resolution of 0,1g at least

1. Insert a new IV-set (only recommended IV-sets may be used, see appendix in the user manual) in the pump (filled with water) and connect the infusion line to a measuring cup on a balance.
2. Enter the configuration mode as described in chapter in chapter 2.3.

Enter the value "123" at address 399. This will force the pump to enter the calibration mode which will be displayed as "bAL tArA".
3. Press the key "START/STOP". The pump delivers a volume of 5 ml at an infusion rate of 250 ml/h ("tArA" is flashing).
4. When "tArA" stops flashing, reset the balance to 0.
5. Press the key "START/STOP". The pump will display "tM 215" (infusion delivery time is 215 seconds). It should now deliver a volume of 15 ml at an infusion rate of 250 ml/h.
6. After the delivery time has elapsed, the pump stops and shows "baL." "12.75" in the displays.
Enter now the value of the balance, e.g. 14.90 g. This value must be within the range of 12.75 – 17.25. Otherwise switch the pump off and restart the volume calibration.
7. Press the key "START/STOP" to acknowledge the entered value.
8. The pump displays the new correction factor, e.g. 1013.
9. Press the key "START/STOP" to store the new correction factor acknowledged by a buzzer sound. The pump display changes back to "bAL tArA" again.
10. Switch the pump off. Do not remove the infusion set!
11. Perform a control measurement with an infusion rate of 250 ml/h and an infusion total of 15 ml. Repeat the calibration procedure if necessary.

5.6. Pump specifications

Please refer to the user manual for the specifications (chapter 8).

5.7. Fault codes

A technical failure will be signalled by the pump with a continuous alarm display and a continuous sound. During this state, the fault code which causes the pump to fail can be displayed by pressing the key "MODE".

IF the pump was switched OFF after a detected failure, the fault code will be stored in the configuration of the pump, please refer to chapter 2.6 (Addresses 380-389).

The possible fault codes registered in the configuration are listed in the table below:

Fault Code	Failure
F_21	ROM test
F_22	ROM check (Runtime)
F_23	RAM test/check
F_24	XRAM test/check
F_25	CPU test
F_26	Invalid function menu
F_27	EEPROM data invalid
F_28	RTC data invalid, no RTC etc
F_29	Stepper motor power test (delayed 5s)
F_32	5Volt supply out of range
F_33	24Volt supply out of range (delayed 5s)
F_37	Downstream pressure sensor test failed (always > 4.7V, delayed 5s)
F_38	Upstream pressure sensor test failed (always > 4.7V, delayed 5s)
F_39	Downstream pressure sensor test failed (dynamical test failed)
F_40	Upstream pressure sensor test failed (dynamical test failed)
F_44	Address invalid for config-EEPROM
F_45	Address invalid for history-EEPROM
F_46	Frequency from uC or RTC out of range
F_47	Display-print not present
F_48	Key(s) too long active
F_49	Sensor-print not present
F_50	AIL (Air in line) detector test failed
F_51	Movement test failed (Home-Pulse < (Hall / Home))
F_52	Movement test failed (Home-Pulse > (Hall / Home))
F_53	More than one rotation at 'STOP' without 'KVO'
F_54	Infused sum <> Calculated sum (Rotations)
F_55	Frequency calculation
F_57	Rotation (SW overflow)
F_58	Volsum control

We recommend replacing the main board in case a fault code is not included in this list above.

6. REPLACEMENT OF PARTS

6.1. General

CAUTION!

The ARGUS 707 may only be used with accessories and spare parts which have been approved by ARGUS Medical AG for safe technical use.

CAUTION!

If a door, a housing, a pressure sensor or a main board is replaced, a full calibration (pressure sensors and volume calibration) is required.

6.2. Disassembling of the ARGUS 707

CAUTION!

Disconnect the mains cable from the power outlet before opening the housing!

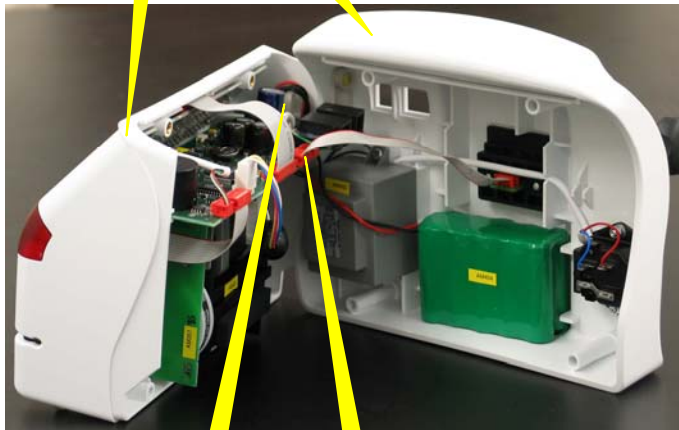
Observe the antistatic protection rules when disassembling the ARGUS 707 (the use of an antistatic table mat and a grounded clip are recommended).

6.2.1. Disassembly of the case

1. Remove the four screws on the back side.



2. Separate the front and the back side.



3. Disconnect the battery, the supply and the docking interface connection.

6.2.2. Removing the pump door

1. Gently press this hinge stopper backwards.

2. Pull the shaft towards the centre. Repeat point 1 and 2 for the other side of the door and then remove the door.



6.2.3. Disassembling the pump unit

1. Unscrew these screws. Remove the pump unit.



6.2.4. Assembling the pump

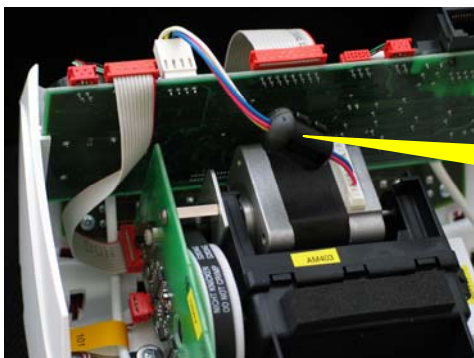
1. Use the screw with a washer at these places (torque 1.0 Nm)!



2. Use the screw without a washer at these places (torque 1.0 Nm)!

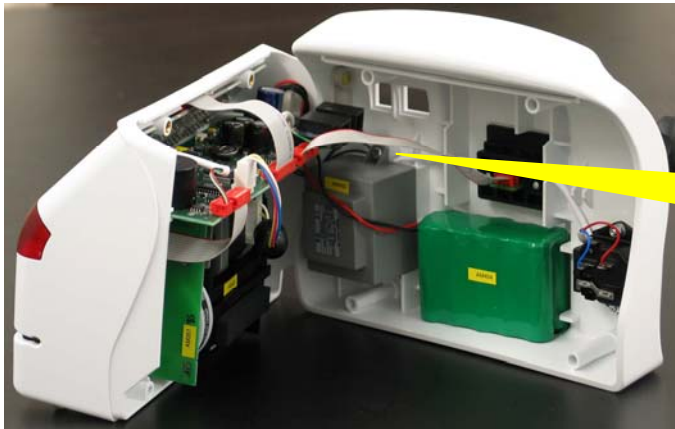


3. Reinstall the door. Make sure that a washer has been installed on each side!



4. Make sure that this part touches nowhere, otherwise noises may be generated!

REPLACEMENT OF PARTS



5. Reconnect the back side with the front side (battery, power & docking interface)!



6. Make sure that both cables are correctly placed in the notch before the main board is inserted!

7. Use the short screw at these places (torque 1.1 Nm)!



7. Use the long screw at these places (torque 1.1 Nm)!

Mind the torque for the screws listed below:

Combination clamp	1.0 Nm
-------------------	--------

Transformer	1.0 Nm
-------------	--------

All other screws not mentioned in this chapter:	0.6 Nm
--	--------

6.3. Replacements of parts

CAUTION!

The ARGUS 707 may only be used with accessories and spare parts which have been approved by ARGUS Medical AG for safe technical use.

For the part numbers of replacement parts consult the following chapter.

6.4. Spare parts



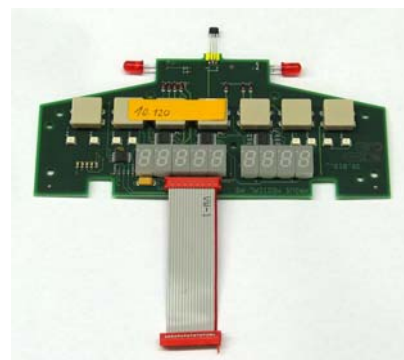
10.087 Combination clamp



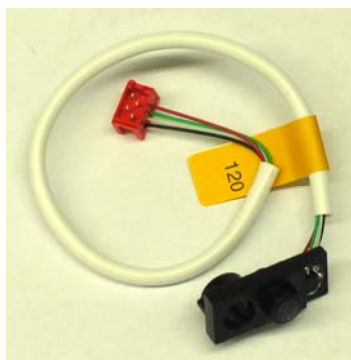
10.089 External drop detector



10.093 Interface cable docking pumps



10.120 Display board A707



10.121 Pressure sensor
A707

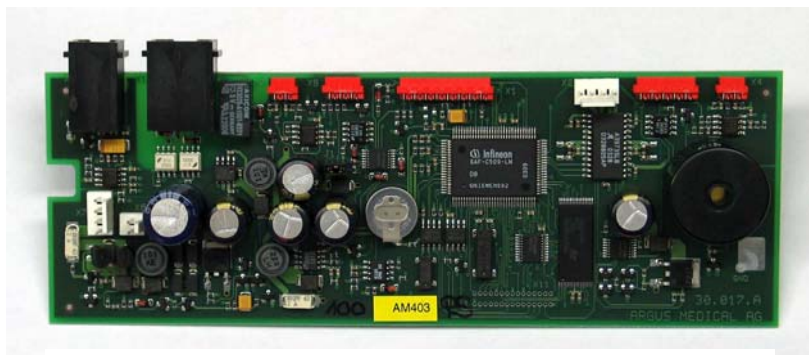


10.122 Air detector A707

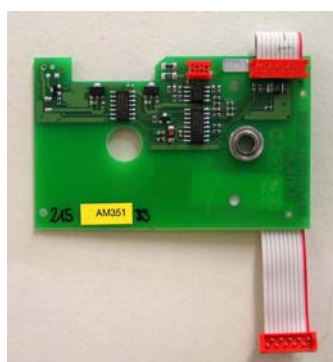
REPLACEMENT OF PARTS



10.123 Stop flow A707



10.124 Main board A707



10.125 Sensor board A707



10.126 Pump unit A707

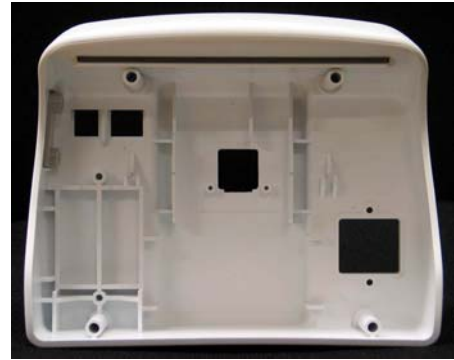


10.127 Door complete A707

REPLACEMENT OF PARTS



10.128 Casing back plane A707
230VAC complete



10.136 Casing back plane A707



10.129 Casing forepart (without door)
complete



10.137 Casing forepart



12.011 Interface cable 8pol/2m
& 12.012 Interface adapter



12.042 Cable staff alert 2m



10.119 Battery NiMhd 12V/1500mAh A707



11.221 Sealing A707

REPLACEMENT OF PARTS



12.035 Pressure gauge
with stopcock



Part no. 11.222 Front panel A707



10.135 Edge board complete A707



11.005 Bottle holder 45 cm
11.043 Bottle holder 60 cm

Part no.	Description
11.237	Identification plate A707
11.238	Label flow direction
11.239	Short instruction German
11.240	Short instruction English
11.241	Short instruction French
11.242	Short instruction Danish
11.243	Short instruction Dutch

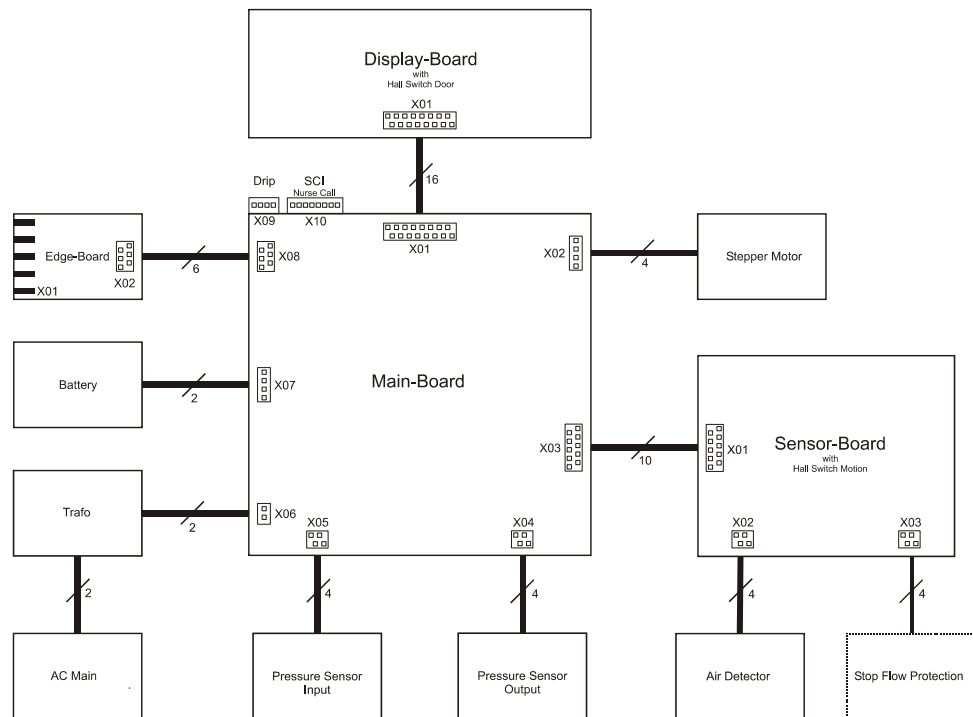
Part no.	Description
11.244	Short instruction Czech
11.245	Short instruction Portuguese
11.246	Short instruction Spanish
11.247	Short instruction Italian

7. SAFETY STANDARD CHECK

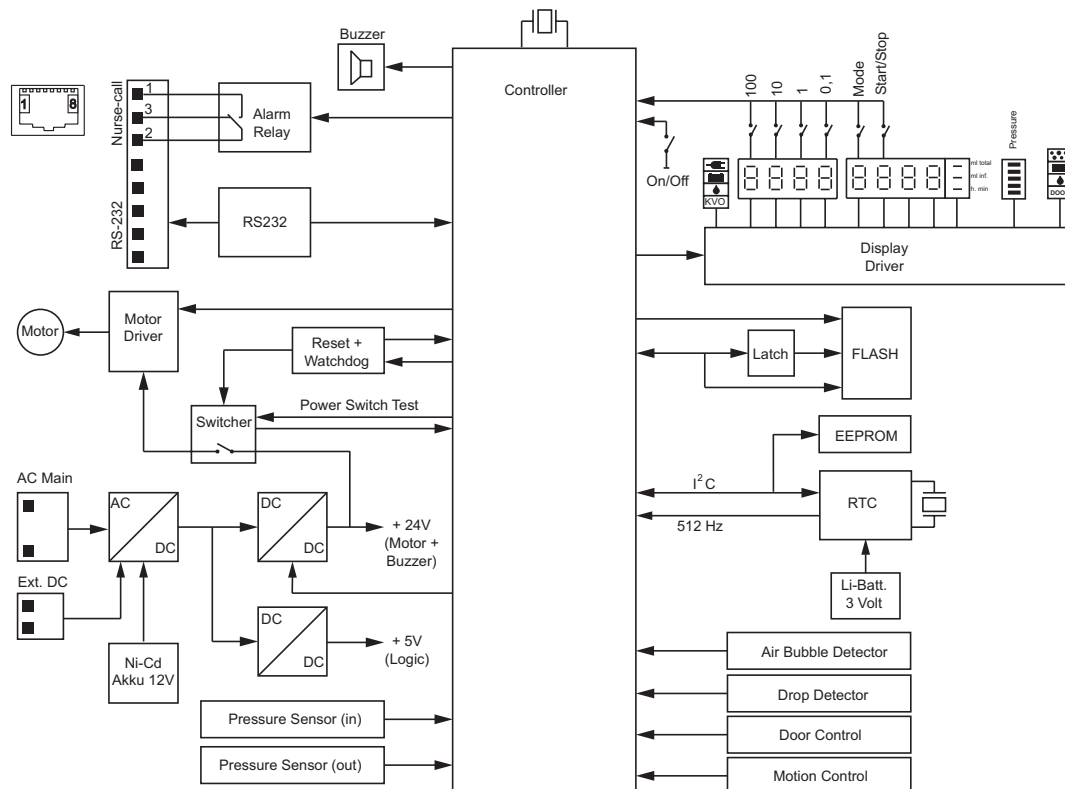
The safety check should be done at least every 10'000 running hours or every 24 months.

Refer to the form in the appendix of this manual.

8. WIRING DIAGRAMM



9. BLOC SCHEMATIC



10. APPENDIX

Safety standard check (SSC)		ARGUS 707	ARGUS Medical AG
Serial-no.:		Inventory-no:.....	
Hospital:			
Department:			
Customer:			
The SSC has to be performed at least every 24 months or after 10'000 hours of operation. The check has to be done in accordance to the user- and service manuals.			
1	Visual check for damage, cleanness and completeness	- Housing, labels, accessories, connectors, power cable, etc.	
2	Test the function of the stop flow clamp	- Proper movement of the clamp	
3	Keep "MODE" pressed while switching on the pump	- Display pump type and software release - Display of 2, 4, 7, F., in numeric display - Display of all operation- and alarm indicators	
4	Connect/Disconnect the pump to the mains	- The indicator "external supply" lights up	
5	Test the drop detector by simulating drops	- Check the green "drop" indicator	
6	Test the door switch, open and close the door	- Door open the "door" indicator lights up - Door close the "door" indicator turns off	
7	Open the door and remove any IV-set	- Indicator "air bubble" lights up	
8	Install a water filled IV-set, close the door	- Indicator "air bubble" turns off	
9	Set rate to 333.3 m/h, press "START", disconnect the drop detector	- The red indicator "drop" lights up (delayed) - The acoustical alarm turns on	
10	Press "MODE"	- The acoustical alarm mutes	
11	Check the external connector "nurse call"	- Relay contact switches (see chapter 9)	
12	Calibration of the pressure sensors IV-set type used: Codan..... Other.....	- See chapter 5.3 and 5.4 of the service manual	
13	Volume calibration	- See chapter 5.5 of the service manual	
14	Charge the battery while the pump is running 16 hours, at a rate of 30.0 ml/h	- The indicator "external supply" must light	
15	Battery check at a rate of 30 ml/h. Run the battery test until the pump switches off automatically	- The green indicator "battery" lights up during this test	
16	Printout the pump history (refer to chapter 3.4)	- Check the battery run time by checking the latest history entries, > 4h 30min - Check the pump internal time and date	
17	Electrical test according to EN60601-1 (all measurements made with a power cable 2.5 m)	- Measurements attached	
18	Charge the battery after this test!		
The pump has passed the SSC and is safe for use			
Date:			
Name:			
Signature:			